151. Again, there are many substances which contain elements such as would be expected to arrange themselves at the opposite poles of the pile,, and therefore in that respect fitted for decomposition, which yet do not conduct. Amongst these are the iodide of sulphur, per-iodide of zinc, per-chloride of tin, chloride of arsenic, hydrated chloride of arsenic, acetic acid, orpiment, realgar, artificial camphor, etc.; and from these it might perhaps be assumed that decomposition is dependent uoon conducting power, and not the latter upon the former. The true relation, however, of conduction and decomposition in those bodies governed by the general law which it is the object of this paper to establish, can only be satisfactorily made out from a far more extensive series of observations than those I have yet been able to supply.[1]

152. The relation, under this law, of the conducting power of electricity to that for heat, is very remarkable, and seems to imply a natural dependence of the two. As the solid becomes a fluid, it loses almost entirely the power of conduction for heat, but gains in a high degree that for electricity; but as it reverts back to the solid state, it gains the power of conducting heat, and loses that of conducting electricity. If, therefore, the properties are not incompatible, still they are most strongly contrasted, one being lost as the other is gained. We may hope, perhaps, hereafter to understand the physical reason of this very extraordinary relation of the two conducting powers, both of which appear to be directly connected with the corpuscular condition of the substances concerned.

153. The assumption of conducting power and a decomposable condition by liquefaction, promises new opportunities of, and great facilities in, voltaic decomposition. Thus, such bodies as the oxides, chlorides, cyanides, sulpho-cyanides, fluorides, certain vitreous mixtures, etc., etc., may be submitted to the action of the voltaic battery under new circumstances; and indeed I have already been able, with ten pairs of plates, to decompose common salt, chloride of magnesium, borax, etc., etc., and to obtain sodium, magnesium, boron, etc., in their separate states.

[1] See 414, etc., etc.—December 1838.